North American Marine Protected Area Rapid Vulnerability Assessment Tool

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User Guide

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Worksheets

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Example of Completed Worksheets

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This tool has three parts (a **user guide**, a set of blank **worksheets**, and a booklet containing **sample completed worksheets**) that are available as downloadable PDFs. The blank worksheets are in a dynamic PDF format so that users can easily fill, save and share their completed worksheets.

This tool is a product of the CEC's 2015-2016 project *Marine Protected Areas: Strengthening Management Effectiveness and Supporting Coastal Community Resilience*: **www.cec.org/our-work/ecosystems**

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Step 1
Define the scope of the vulnerability assessment

Select the parameters that define your site and management priorities.

Step 2
Construct your assessment matrices

On the following pages you will transfer your choices from **Step 1** to create your Assessment Matrices.
Use the following guidance to assist, but see full details in the *Rapid Vulnerability Assessment Tool User Guide*.

Step 3
Undertake your assessment

Undertake your assessment by completing Tables 1-3 with available science and local knowledge.
Wherever applicable, indicate the references that provided the information used.

Table 1: Vulnerability Assessment

Column A: List the relevant climate change stress selected in **Step 1**.
Column B: Describe what you know about the direction and magnitude of the observed or projected change.
Column C: Describe the anticipated effect of each climate change stress listed on this habitat type.
Column D: Given all the information you know, assign the **likelihood** of the anticipated effects on the habitat described in Columns C occurring in the chosen timescale. In doing this you are considering certainty based on your knowledge of the evidence and consensus of the interpretation of this evidence.

Almost certain (>50% probability), **Likely** (50/50 probability), **Possible** (less than 50% but not unlikely)
 Unlikely (probability low but not zero), **Rare** (probability very low, close to zero)

Column E: Insert Consequences from the final row of **Table 2**.
Column F: Using **Figure A** determine the Risk relating to this climate stress for this habitat type.
Column G: Transfer Adaptive Capacity assessment from the final row of Table 3.
Column H: Find the **Vulnerability** based on the Risk (**Column F**) and Adaptive Capacity (**Column G**) using Figure B.

Repeat this process for each habitat type.

Table 2: Consequences Assessment

Column A: List the relevant non-climate stressors from **Step 1**.
Column B: Describe how these non-climate stressors have currently or historically affected this habitat.
Column C: Indicate if climate change is expected to make these effects better (less problematic) with a (+) or worse (more problematic) with a (-).
Column D: In each box at the top of **Column D**, list the climate change stresses considered in **Column A** of **Table 1**. What is the combined impact of each non-climate stressor with each of these climate stresses?
Bottom Row: **Consequence**. Considering the direct effects of the climate stress and the combined effects of all of the non-climate stressors on each climate stress, what will be the consequence of the effect on this habitat type given what you know? *If positive consequences are identified, they will be addressed in the narrative vulnerability assessment.*

 Catastrophic (Habitat ceases to exist/function permanently altered)
 Major (Key species or functions dramatically altered, value is undermined)
 Moderate (Species decline, function diminished, habitat seen as degraded but still present)
 Minor (Habitat will continue to function but activities such as recovery will be impaired)
 Negligible (Habitat and its key components will not be visibly or functionally affected)

Table 3: Adaptive Capacity Assessment

Column A: Add any additional ecological potential or social potential factors that will affect your ability to support adaptation in the habitat type.

Column B: Indicate the status of each social potential factor and condition of each ecological potential factor on a scale from 1 to 5.
5=Superior, 4=Good, 3=Fair, 2=Poor, 1=Critical

Bottom Rows: **Average**: Find the average for all factors in each category.

Combined Average: Find the average of ecological and social potential combined.

Adaptive Capacity: Convert the combined average to an adaptive capacity score of **High**, **Moderate** or **Low**, using the conversion tool at the bottom of the page.

Step 4
Adaptation strategy development

Once the issues relating to High and Moderate vulnerability are identified, it is time to begin considering what, as MPA managers, you can do to reduce those vulnerabilities. By considering the climate stresses of concern and the factors of the habitat that are the key drivers of the vulnerability (likelihood, consequence and adaptive capacity), adaptation strategies can be developed.

Step 5
Create your own narrative vulnerability assessment report

The RVA worksheets can give you a great deal of information but it is a useful step to convert these analyses into a narrative form both to allow you deeper exploration of the findings and to create a product that can be more easily digested by partners.

Vulnerability assessments are often very long, including detailed explanation of the supporting evidence provided by climate science, ecological analysis, site monitoring and modeling. However in the RVA process the product will be more succinct with reference to supporting material, rather than inclusion.

The shortest version is a Vulnerability Statement. This can be useful in helping you think through your process, although it is unlikely to be used as a standalone product. Sample provided in *Rapid Vulnerability Assessment Tool Example of Completed Worksheets*.

Figure A. Risk = Likelihood x Consequences

Likelihood	Consequences				
	Negligible	**Minor**	**Moderate**	**Major**	**Catastrophic**
Rare	Low	Low	Low	Low	Low
Unlikely	Low	Low	Moderate	Moderate	Moderate
Possible	Low	Moderate	Moderate	High	High
Likely	Low	Moderate	High	High	Extreme
Almost certain	Low	Moderate	High	Extreme	Extreme

Figure B. Vulnerability = Risk x Adaptive Capacity

Risk	Adaptive Capacity		
	Low	**Moderate**	**High**
Low	Low	Low	Low
Moderate	Moderate	Moderate	Low
High	High	Moderate	Moderate
Extreme	High	High	Moderate

Box 1.
What habitat types are you
considering for this assessment?
(Select 3 that are your priorities)

Select	Habitat Type
	Beach and dunes
	Cliffs and rocky shore
	Rocky intertidal
	Soft bottom intertidal and mudflats
	Estuary/wetland
	Pelagic
	Kelp forest
	Seagrass
	Coral reef
	Mangrove/Coastal Forest
	Deep seafloor, canyon
	Ice/Snow
	Other:

Box 2.
What timescale are you interested
in assessing? (Select 1)

Select	Timescale
	Near term (present to 10 years)
	Medium term (next 50 years)
	Long term (next 100 years)
	Very long term (> next 100 years)

Box 3.
What climate change variables
are likely to affect these habitats?
(Select 3 that are your priorities)

Habitat

			Climate Stress
			Increased water temperature
			Sea-level rise
			Diminish dissolved oxygen
			Altered currents
			Altered upwelling/mixing
			Altered precipitation patterns
			Ocean acidification
			Turbidity
			Wave action/coastal erosion
			Salinity
			Storm severity/frequency
			Harmful algal blooms
			ENSO/PDO
			Other:

Box 4.
What non-climate stressors currently
affect these habitats? (Select 3 that
are your priorities)

Habitat

			Non-climate Stressor
			Land-source nutrient pollution
			Land-source non-nutrient pollution
			Marine-source pollution and spills
			Development/population growth
			Harvest
			Aquaculture
			Invasive species
			Disease
			Tourism/Recreation
			Transport
			Extraction (mining, oil & gas)
			Energy production
			Overwater/underwater structures
			Roads/armoring
			Dredging
			Boat groundings
			Noise
			Researcher disturbance
			Altered sediment transport
			Other:

Table 1. Vulnerability Assessment (repeat for each habitat type)

Location:		Habitat Type:					Timescale:	
Ⓐ Climate Stress	**Ⓑ Indicate the observed or projected direction and magnitude of this stress, as well as any specific relevant details**	**Ⓒ Anticipated effects on this habitat type** (Highlight any important features that might be affected)	**Ⓓ Likelihood**	**Ⓔ Consequence (Table 2)**	**Ⓕ Risk (Figure A)**	**Ⓖ Adaptive Capacity (Table 3)**	**Ⓗ Vulnerability Level (Figure B) and Key Drivers**	

Table 2. Consequences (Use results of Table 2 to complete Column E on Table 1.)

Location:	Habitat Type:		Timescale:			
Ⓐ Non-climate stressor	**Ⓑ How does this stressor affect this habitat type?**	**Ⓒ Will climate change make this better or worse? (+)(-)**	**Ⓓ What is the combined impact of this non-climate stressor and…** [Insert your three climate stresses here]			
Consequence: Assess the consequence of the direct effect of the climate stress in tandem with existing non-climate stressors on this habitat type. (Negligible, Minor, Moderate, Major, Catastrophic)						

Table 3: Adaptive Capacity Assessment of Habitat

	C Assess status and condition of each factor of Adaptive Capacity for this habitat. Rate on a scale from 1-5 (5=Superior, 4=Good, 3=Fair, 2=Poor, 1=Critical) [If your answers vary by stressor, consider evaluating the habitat for each stressor separately.]	
A Ecological Potential	**Habitat (and stressor if applicable):**	**Rationale:**
Extent, Distribution & Connectivity		
Past Evidence of Recovery		
Value/Importance		
Physical Diversity		
Biodiversity		
Keystone & Indicators Species		
Other:		
Ecological Potential Average		
B Social Potential		
Organization Capacity		
Staff Capacity (training, time)		
Responsiveness		
Stakeholder Relationships		
Stability/Longevity		
Other:		
Management Potential		
Existing Mandate		
Monitoring & Evaluation Capacity		
Ability to Learn and Change		
Proactive Management		
Partner Relationships		
Science/Technical Support		
Other:		
Social Potential Average		
Combined Potential Average		
Adaptive Capacity		

Convert average to adaptive capacity rating: Low = 1 – 2.3; Moderate = 2.4 – 3.6; High = 3.7 – 5

For each stress with a high or moderate vulnerability score, develop a list of adaptation strategies that could reduce that vulnerability. Where possible, consider strategies that address multiple vulnerabilities.

Table 4: Strategy Development

Ⓐ Vulnerability	Ⓑ Strategies	Ⓒ Cost (H/M/L)	Ⓓ Efficacy (H/M/L)

Table 5: Strategy Implementation

Ⓐ Strategy	Ⓑ Leader and potential partners	Ⓒ Monitoring and evaluation criteria	Ⓓ Funding/Costs	Ⓔ Existing or needed management mechanisms	Ⓕ Timeline

The [_____] assessed the vulnerability of
     MPA name

[_____] from [_____
Habitat type   *Climate stresses*

_____]

over the next [_____]. Climate change stressors are
          Timescale

expected to [_____
         Projected or observed effects

_____].

Existing non-climate stressors in this habitat include [_____
                              Non-climate stressors

_____]. They currently affect the system by

[_____
 Effects of non-climate stressors

_____]. Climate

change may interact with these non-climate stressors by [_____
                                  Examples of interactions

_____].

Vulnerability was identified as being greatest due to [_____
                          Climate stresses with highest vulnerability ratings

_____]. This vulnerability was due to [_____
                                            Drivers: high likelihood of change,

_____]. Particular vulnerabilities of concern related to
high consequences or low adaptive capacity

[_____
 include example of an effect of climate stress on the habitat, this could include an interaction with a included non-climate stressor

_____]. Adaptation strategies that might reduce this vulnerability

[_____]. In order to implement
 adaptation strategy

this strategy, we will need [_____
                  List partners, funds, mandate or other features that will be needed to bring about implementation,

_____].
or indicate that it could be done internally with resources already on hand

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